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A Flight of Fantasy
or
The Next Major
Space Product?

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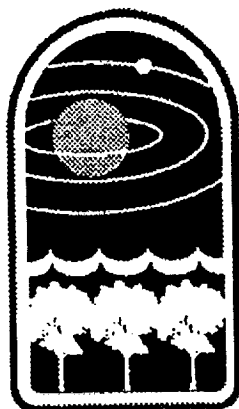
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SPACE TOURISM: A FLIGHT OF FANTASY OR THE NEXT MAJOR SPACE PRODUCT?

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ABSTRACT

In the euphoria of the early 1980's, a number of creative proposals for "non-traditional" uses of space were suggested. Taking tourists to space, possibly as early as the 1990's, was one such proposal. While it is now obvious that space tourism is not going to become a reality soon, history has proven that wherever explorers go, tourists (and hoteliers, restaurateurs, and tour guides) will someday follow. This paper discusses past and present efforts to promote space as a tourist destination.

INTRODUCTION

Webster defines "tourism" as the practice of traveling for recreation; the guidance or management of tourists; the promotion or encouragement of touring; or, the accommodation of tourists. Tourism is a big industry; estimates of revenues worldwide exceed \$3,500 billion.¹

Clearly space has attributes which make it an attractive tourist mecca: it provides the opportunity for adventure, great scenery, new things to learn about, and the opportunity to do something unique and literally "out of this world." The properties of space which make it different from Earth (and valuable to space scientists) also make it interesting to the tourist. Because tourism involves relatively short exposure to space (compared to long-duration space flight or colonization) the tourist can seek to experience these differences while avoiding their consequences. For example, while it may be desirable to create artificial gravity to live and work permanently (or for long periods) in space, a person in orbit for only a short time (8 to 12 hours) would experience weightlessness with only minimum exposure to its long term negative effects.

On the negative side, the potential disadvantages of space tourism include the relatively high risk associated with space flight, the level of difficulty of preparation, and, possibly, physical discomfort during the trip. While adventurous tourists do go to "hostile Earth regions" such as the Arctic and Antarctic, they constitute only a small fraction of the mass tourist market.

Although it is sometimes difficult to distinguish between the two, a tourist is one who travels for pleasure or culture and an explorer is one who travels in search of geographical or scientific information. Using these definitions, it

can be argued that the first space tourist journey took place in December 1990 when Japanese journalist Toyohiro Akiyama was a paying passenger on the Soyuz TM spacecraft. However, since Mr. Akiyama's trip was paid for by his employer he was a journalist on assignment rather than a tourist.

The ground segment of space tourism is already a reality. One need only look at the crowds of people of all ages and nationalities that daily fill the Air and Space Museum in Washington, D.C. and Spaceport USA in Florida to realize that tourists are interested in space. If public access to space were made available, would there be a sufficient market (made up of more than a relatively small number of individuals financed by governments or corporations) to support an industry?

ORIGINS OF MAN'S QUEST TO LEAVE THE EARTH

Fulfilling man's age-old dream to fly brought about the development of first aviation and then space travel. When he observed the birds, man wanted to fly; when he observed the sky he wanted to explore the universe. The first known author to write about space travel was Lucien of Samosata in the second century A.D. He describes in *Verq Historia* a trip to the Moon by a ship lifted through the air by a great storm.²

Rockets were not invented in order to provide the means for space travel, but by the early 16th century at least one person was thinking about them in this context. A report of two- and three-stage rockets, written by Conrad Haas between 1529 and 1555, includes flight theories and also describes a space capsule.³

The second half of the 19th century has been called the "Golden Age" of space-related science fiction novels. Jules Verne published the historic *From the Earth to the Moon* in 1865, and *A Trip Around the Moon* 5 years later. Edward Everett Hale's *The Brick Moon*, which contained the first description of a manned space station, was published serially in 1869-1870. At the turn of the century, Herbert George (H.G.) Wells wrote his classics *The War of the Worlds* and *The First Men in the Moon*. Although works of fiction, these novels had a significant impact on the development of space travel. They inspired men to believe that rocket-powered means of space travel could be developed and they were written during a period when technical advances in areas such as metallurgy, heat engines, and propellants actually made space travel possible.

These works of science fiction had a strong influence on the young people of that time. The "Fathers" of space rocketry--Herman Ganswindt (1856-1934), Konstantin Eduardovitch Tsiolkovsky (1857-1935), Robert Hutchings Goddard (1882-1945), and Hermann Oberth (1894-1989)--each admitted that he had been inspired by the books of Jules Verne and the other science fiction writers of the era. Tsiolkovsky correctly predicted, in a speech made in 1933, that many in the audience would witness an interplanetary flight.⁴ It is reasonable to believe that at least some in the audience were still alive 36 years later when Neil Armstrong became the first man to walk on the Moon's surface on July 21, 1969. Tsiolkovsky died in 1935; on his tombstone is the fitting epitaph, first spoken by Tsiolkovsky himself years earlier: "Mankind shall not remain on Earth forever."⁵

Of the four fathers of space rocketry, only Hermann Oberth--who died in 1989--lived to see his prediction of manned space travel fulfilled. In 1923 Oberth had published, at his own expense, his first book *By Rocket to Interplanetary Space*, which not only discussed rockets in general but also contained descriptions of a space ship, a space station, and even a suit for the astronauts.⁶ Oberth had intended the book to be his doctoral thesis until he learned, much to his amazement, that his university refused to accept it since "space flight" did not exist in science. Oberth eventually became a teacher and saw the success of his long held dream--the realization of manned flights to the Moon and back--under the responsibility of one of his former students, Wernher von Braun.

Once space flight became a reality, space tourism became possible. Krafft Ehrlicke laid the foundation for future studies with his paper "Space Tourism" which was presented at the Thirteenth Annual Meeting of the American Astronautical Society and published in 1967.⁷ The paper contains designs for extensive orbital tourist facilities and hotels utilized by space tourists arriving on a reusable aerospace transport operating on a schedule of two flights daily.

CONTEMPORARY SPACE TOURISM EFFORTS

Taking tourists to space was among the plethora of creative proposals for commercial uses of space generated in the euphoria of the early 1980's. One of the more notable space tourism efforts was undertaken by Society Expeditions, a Seattle, Washington travel organization which studied the feasibility of making space voyages available to the general public. In August 1985, representatives of Society Expeditions presented the results of their study to NASA.⁸ Their plan included organizing and operating space tours for more than 10,000 people in the decade between 1992 and 2002.

Robert Citron, who had advanced the idea of Shuttle passenger modules for Society Expeditions, founded a company called Space Travel and proposed to offer passengers a ticket for a ride on the Shuttle for \$1 million per seat. Passengers would be carried in a part of the Shuttle cargo bay converted into a pressurized habitable environment, fitted to accommodate passengers. However, NASA rejected the idea, having concluded that it was unsafe to carry people outside the crew compartment during launches and landings.

NASA's decision precluded the use of a pressurized module for carrying passengers, but not for other uses. Development of a module--eventually called Spacehab--continued.⁹ Spacehab, whose maiden flight was a 10-day mission (June 21 through July 1, 1993) aboard the Shuttle Endeavor, is today a pressurized laboratory which fits in the forward portion of the Shuttle payload bay and connects to the crew compartment through the Orbiter airlock. Thus, an idea which began as a tourism concept has evolved into hardware providing standard middeck lockers and crew-tended access to the microgravity environment for experimentation, technology development, and small-scale production on the Shuttle.

Although the idea of passengers in the cargo bay of the Shuttle was rejected, the concept of public access to space was gaining momentum at NASA prior to January

1986. Following closely on the precedent set by the Teacher in Space Program (which had already resulted in the selection of teacher Christa McAuliffe) was the Journalist in Space Program. Had NASA not discontinued the Journalist in Space Program in the wake of the Challenger accident, it is conceivable that one or more American writers would have traveled into space by now. While NASA's programs were clearly not tourist programs, they were based on a philosophy that space should be shared with all citizens instead of being the exclusive domain of professional scientists and explorers.

The idea of using the Shuttle to provide access to space to the general public was also being considered outside NASA. The U.S. Office of Technology Assessment (OTA) proposed for discussion six national goals in its 1984 report *Civilian Space Stations and the U.S. Future in Space*, among which was one to "...involve the public directly in space activities, both on Earth and in space."¹⁰ The OTA also formulated objectives to support the goals. The supporting objective for public access was that "At least hundreds of members of the general public per year, from the United States and abroad, could be selected on an equitable basis and brought into space for short visits there."¹¹ The rationale for the goal and objective was that "Only when a large number of our citizens, representatives of a broad cross-section of our society, begin to experience the 'space adventure' directly, will the space domain and space activities gradually begin to move into the mainstream of our national interests and concerns."¹²

Many ideas for public access to space and space tourism fell by the wayside during the years immediately following Challenger. However, in 1990 a U.S. company, Space Travel Services, obtained an exclusive contract for an American to travel to and spend one week on the Soviet space station Mir. Selection of the traveler was to be made by a sweepstakes drawing. The company reported receiving hundreds of thousands of entries before Texas authorities forced cancellation of the contest.¹³

FUTURE POSSIBILITIES FOR SPACE TOURISM

Eilingsfeld and Abitzsch at the Aerospace Institute of the Technical University of Berlin in Berlin, Germany have studied the prospects of commercial passenger transportation into low-Earth orbit.¹⁴ They conclude that the present transportation cost per passenger to orbit is "far too high to allow any sustainable development of space tourism."¹⁵ Space tourism will only develop if an inexpensive space transportation system is developed specifically for space tourism. Although the technical problems of producing such a vehicle are not insolvable, the resulting prices would be too high for a mass market to develop, even if R&D costs were not included.

In 1993 Eilingsfeld and Abitzsch completed a case study of tourism¹⁶ in which they considered a market model for a thirty-year time span (2020 to 2050) and three different market growth scenarios. A finding of the case study is that a space tourism initiative is feasible, but only if there is a national will to strive for the goal. The authors suggest using a space tour lottery to overcome the initial high prices, while at the same time attracting more people to the concept of space tourism. A "day trip" of up to 12 hours flight duration (equating to five to eight orbits) would be the most practical since it would

eliminate the need for living quarters beyond those currently available on commercial aircraft.

THE BOTTOM LINE

Manned space travel is entering its third decade and the technology for space travel and habitation has advanced considerably. However, space travel is still an expensive--and risky--proposition. As long as access continues to be a scarce and valuable resource, other beneficial uses of space will always be of higher priority than tourism.

Many of America's early settlers came to this country by ship during the last century--often enduring incredible hardships during the sea voyage. They would be shocked to learn that sea cruises are now a popular tourist activity, priced at levels which allow for market development.¹⁷ Cruising became a part of the tourist industry only when appropriate infrastructure was developed to support the activity. A mass market for space tourism can only evolve if a passenger-oriented space transportation system with the following characteristics is developed:

1. Safe and reliable.
2. Per-seat prices low enough to attract sufficient private passengers.
3. A level of comfort equivalent to commercial aircraft.
4. Simplified flight preparation.
5. Schedule predictability.

Development of such a space transportation system would be prohibitively expensive for the private sector. Making space travel possible for a broad base of individuals is not currently accepted as one of the obligations of the U.S. government--and, if for no other reason than fiscal constraints, it is not likely to become one any time soon.

Will space tourism ever develop? The progression from the earliest cave man looking up from Earth to sky to modern space travelers looking down from space to Earth has been accompanied by a change in who is doing the looking. The first dreamers to cast their eyes upward were followed by scientists, engineers, and academicians. Eventually these will be followed by entrepreneurs, colonizers, and settlers and ultimately, tourists. However, for the foreseeable future, space tourism will continue to be only a flight of fantasy.

ENDNOTES

1. S. Abitzsch and F. Eilingsfeld, IAA-92-0155: *The Prospects for Space Tourism: Investigation of the Economic and Technical Feasibility of Commercial Passenger Transportation Into Low Earth Orbit* (43rd Congress of the International Astronautical Federation [September 1992]), p. 9. Worldwide revenues for tourism were estimated at \$3,500 billion for 1992.
2. Beryl Williams and Samuel Epstein, *The Rocket Pioneers*, (New York: Julian Messner, Inc., 1959), p. 31.
3. *Technikgeschichte*, (Düsseldorf: VDI Verlag, 1967). This report was not uncovered until 1963 when the Rumanian engineer-historian Doru Todericiu discovered it in the State Archives in Sibiu (formerly Hermannstadt in Transylvania) in the third part of a book entitled *Diverse Problems of Artillery and Ballistics*.
4. Heinz Gartmann, *The Men Behind the Space Rockets*, (New York: David McKay Company, Inc., 1956), p. 26.
5. Ibid.
6. Williams and Epstein, p. 118.
7. Krafft A. Ehrlicke, "Space Tourism," *Advances in the Astronautical Sciences* 23 (1968) p. 259-291.
8. Society Expeditions, Inc., *One Year Goals for Space Tourism*, presentation to NASA dated August 30, 1985.
9. "Spacehab Mid-deck Module Planned," *Space Business News*, October 7, 1985, p. 1.
10. *Civilian Space Stations and the U.S. Future in Space* (Washington, DC: U.S. Congress, Office of Technology Assessment, OTA-STI-241, November 1984), p. 15. The OTA did not recommend any of the goals or supporting objectives, but listed them as "...the kind of goals and objectives around which consensus might well be formed so as to provide sensible guidance for the Nation's future activities." The report further stated that "It is the panel's judgement that the goals and objectives proposed for discussion are reasonable and important."
11. Ibid., p. 16.
12. Ibid., p. 118.
13. J. E. Davidson, IAA-92-0154: *Commercial Passenger Spaceflight: Recent Innovations and Future Opportunities* (43rd Congress of the International Astronautical Federation [September 1992]).
14. Abitzsch and Eilingsfeld.

15. Ibid., p. 1.
16. F. Eilingsfeld and S. Abitzsch, IAA.1.2-93-654: *Space Tourism for Europe - A Case Study* (44th Congress of the International Astronautical Federation [October 1993]).
17. There are over 100 ships offering 5,000 separate cruises from American ports. At the low end, Carnival Cruise Lines start at \$269 per person, double occupancy, for a three day cruise. The current price range for a trans-Atlantic crossing on the Queen Elizabeth 2 is \$1,395 to \$10,745, including one-way air in opposite direction. The price of a round the world ticket on the Queen Elizabeth 2 can exceed a quarter of a million dollars.